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09/853,674	05/14/2001	Takao Morii	Q62558	6818

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EXAMINER
FISCHER, JUSTIN R

ART UNIT	PAPER NUMBER
1733	3

DATE MAILED: 11/12/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

AS-3

Office Action Summary	Application No. 09/853,674	Applicant(s) MORII ET AL.	
	Examin r Justin R Fischer	Art Unit 1733	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 May 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-6 and 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato (JP 11-78411) in view of Sato (JP 11-78410). As best depicted in Figure 1, Sato '411 discloses a radial pneumatic tire construction having a belt reinforcement structure comprising two belt plies 4 formed of single wire metal cords and a radially outermost reinforcing layer or cap layer 5 formed of organic fiber cords, such as polyethylene naphthalate. While the reference fails to expressly describe the bunching arrangement of the claimed invention, one of ordinary skill in the art at the time of the invention would have found such a design obvious in view of Sato '410 in order to reduce the propagation of cracks that are commonly associated with belt layers. In particular, both Sato '410 and '411 detail the disadvantages of conventional belt reinforcing elements formed of twisted structures and further suggest the aforementioned benefits of using single wire metal cords (analogous to reinforcing elements of claimed invention). Thus, one of ordinary skill in the art at the time of the invention would have been motivated to bunch the single wire metal cords of Sato '411 into a plurality of groups, in view of Sato '410, to reduce the propagation of cracks and ultimately enhance the belt reinforcement characteristics of a given tire.

With respect to claims 5 and 6, Sato '410 describes a bunching arrangement in which between 2 and 6 single steel wire cords are adjacent one another. Thus, since the single wire metal cords are adjacent one another, as depicted in Figure 2, the aspect ratio D_S/D_L is analogous to that of the claimed invention (1/n, where D_S is the short diameter, D_L is the long diameter, and n is the number of metal wires in a given bunch).

With respect to claim 10, Sato '410 suggests a greater interval between adjacent bundles in the radially outer belt layer, wherein said interval in the radially outer belt layer is between 1.05 and 3 times that of the radially inner belt layer. As evident by the numerous examples in Tables 1-3, the intervals are dependent on the specific diameters used for the single wire metal cords and the reference is directed to a plurality of embodiments, some of which meet the broad limitations of the claimed invention. Regarding the distance between bundles in different plies and the overall thickness of the two belt plies, it is clearly evident that a plurality of embodiments detailed by Sato '410 satisfy the limitations of the claimed invention using well known and conventional values for the topping rubber thickness in relation to the cord diameter. For example, if a 0.25 mm single wire metal cord is used, one of ordinary skill in the art at the time of the invention would have expected a distance between bundles in respective belt plies to be a minimum of 0.25 mm and most likely between 0.3 and 0.40 mm (based on topping rubber having a total thickness that is slightly greater than cord diameter). In turn, the overall thickness of the belt plies would be approximately 1.20 millimeters (each ply would have a thickness of appr. 0.60 millimeters using average topping rubber value). **It is noted that the respective distances (especially**

overall thickness and radial distance between bundles in respective belt plies) are dependent on the diameter of the single wire metal cord and the claim fails to require a specific diameter, such that embodiments that use a larger cord diameter within the range of the claimed invention would definitely satisfy the limitations of the claimed invention.

Regarding claim 11, the inclination angle of the single wire metal cords is between 10 and 30 degrees with respect to the equatorial plane of the tire.

With respect to claims 12 and 13, the cap layer of Sato '411 is formed of organic fiber cords, for example polyethylene naphthalate, that are inclined at an angle of 0 degrees with respect to the equatorial plane of the tire.

3. Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato '411 and Sato '410 as applied to claim 2 above, and further in view of Bourgois (US 5,198,307). While Sato '411 and Sato '410 teach the bunching of single wire metal cords having a diameter between 0.20 and 0.35 millimeters, the references fail to describe the specific makeup of said single wire metal cords (i.e. composition of metal and tensile strength). In any event, one of ordinary skill in the art at the time of the invention would have recognized the composition and properties of the claimed invention as defining well known metals that are extensively used in belt reinforcement structures, as evidenced by Bourgois. In this instance, Bourgois suggests a similar belt structure in which single wire metal cords having a diameter between 0.10 and 0.40 millimeters are bunched together, wherein said single metal wire cords have a preferred carbon content between 0.75 and 0.85 % and a tensile strength defined in relation to the diameter of said single wire metal cords that renders the broad range of the claimed

invention obvious (Column 1, Lines 30-40). As such, one of ordinary skill in the art at the time of the invention would have readily appreciated and expected the single wire metal cords of Sato '411 to exhibit the same tensile characteristics and be formed of a similar composition, regarding carbon content, in view of well known belt reinforcement materials, as evidenced by Bourgois.

Regarding the tensile strength, Bourgois provides the following statement: "The core filaments (analogous to single wire metal cords) preferably have a tensile strength **above**

$2{,}235 - 1{,}130 * \log d$ (N/mm^2 or MPa)

whereby d is the filament diameter expressed in mm." The following table provides a list of different diameters falling within the range of the claimed invention and suggested by both Sato '410 and Sato '411 and their corresponding tensile strength.

	Diameter (mm)	Tensile Strength (MPa)
Example 1	0.20	> 3,115
Example 2	0.25	> 3,005
Example 3	0.30	> 2,916

4. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato '411 and Sato '410 as applied to claim 2 above, and further in view of Kawase (US 3,929,180). Sato '411, in view of Sato '410, discloses a radial pneumatic tire

construction in which a two ply belt layer is sandwiched between a carcass structure a radially outermost cap layer, wherein said belt layer contains reinforcing elements in the form of single wire metal cords that are arranged in bundles. In describing the radial carcass, however, the references are completely silent with respect to any specific material. In any event, the use of PEN (polyethylene naphthalate) cords in a carcass structure is extremely well known and conventional. For example, Kawase describes the use of PEN cords to form a radial carcass structure since such a cord provides a plurality of advantages over conventional materials, such as steel, nylon, rayon, and even polyethylene terephthalate, including better high speed durability and fatigue resistance (Column 6, Lines 35-55). As such, one of ordinary skill in the art at the time of the invention would have found it obvious to form the carcass of Sato '411 with PEN cords since the aforementioned benefits are desirable in all vehicle tires.

5. Claims 15-19 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato '411 and Sato '410 as applied to claim 2 above, and further in view of either one of Sinopoli (US 5,743,975) or Gummiwerke (DE 2734586). Sato '411, in view of Sato '410, discloses a radial pneumatic tire construction in which a two ply belt layer is sandwiched between a carcass structure a radially outermost cap layer, wherein said belt layer contains reinforcing elements in the form of single wire metal cords that are arranged in bundles. The references, however, fail to include a distinct rubber layer between said belt layer and cap layer. In any event, one of ordinary skill in the art at the time of the invention would have found it obvious to include a rubber layer in the crown reinforcement design of Sato '411 in order to control the spacing between reinforcing elements in the belt layer and the cap layer and optimize the reinforcing capability of

said cap layer over a desired region, as evidenced by Sinopoli (Figure 1 and Column 5, Lines 7-10) and Gummiwerke (Figures 1-4 and Abstract). In this instance, both references are directed to the employment of a rubber layer between a belt structure and a radially outermost cap layer for the benefits detailed above, which is analogous to the crown design of the claimed invention. As such, the inclusion of such a rubber layer between the belt layer and the cap layer of Sato '411 would have been well within the purview of one of ordinary skill in the art at the time of the invention.

With respect to claim 17, the broad range of the claimed invention would have been obvious to one of ordinary skill in the art at the time of the invention in view of Sinopoli and Gummiwerke. First, while Sinopoli fails to expressly describe the width of the rubber layer, Figure 1 appears to depict the rubber layer as extending the same width as the cap layer, which in itself extends slightly beyond the edges of the belt structure. Thus, one of ordinary skill in the art at the time of the invention would have expected the rubber layer to have an axial width that is greater than 100% of the width of the innermost belt layer and further would have readily appreciated an embodiment in which the extension was less than 10% beyond the extent of the innermost belt layer. Gummiwerke, on the other hand, describes the extension of the rubber layer as being approximately 75% of the cap layer width. As depicted in Figures 1 and 2, the cap layer has an axial width that is approximately the same as the axial width of the innermost belt layer, thereby suggesting an embodiment that satisfies the limitations of the claimed invention. Furthermore, even if the cap layer has an axial width that is slightly smaller than the innermost belt layer, as depicted in Figures 3 and 4, the close proximity of the respective axial edges and the language of Gummiwerke (approximately 75%) would

have directed one of ordinary skill in the art at the time of the invention to include a rubber layer between the belt layer and the cap layer in accordance to the dimensions of the claimed invention.

With respect to claim 18 and 19, applicant defines a first range of 0.2 to 1.2 millimeters for the thickness of the rubber layer and a second, narrower range of 0.3 to 0.8 millimeters for the same. While Sinopoli fails to address the thickness of the rubber layer, the relevant figures appear to depict a rubber layer having a thickness on the same order as the adjacent belt plies (i.e. rubber layer that depicted as being significantly large or thin). Thus, since the claimed dimensions define well known belt structures depending on the specific type of tire, one of ordinary skill in the art at the time of the invention would have found it obvious to include the quantitative relationships of the claimed invention, it being further noted that the claimed ranges represent well known dimensions of rubber layers, in general, that are disposed between respective plies in the belt region. Also, Gummiwerke suggests a rubber thickness that is between 0.7 and 2.5 times the diameter of the reinforcing element in the belt layer, which defines a rubber thickness in Sato '411 of between 0.14 and 0.88 millimeters, which incorporates all of the values of the preferred range of the claimed invention.

Regarding claim 22, it is well known and conventional in the tire industry to reinforce a given rubber component with short fibers, either organic or steel, in order to provide increased modulus and strength properties as desired.

6. Claims 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato '410, Sato '411, Sinopoli, and Gummiwerke as applied to claim 16 above, and

further in view of Kanamaru (US 5,154,217). As previously stated, Sato '411, in view of Sato '410, discloses a radial, pneumatic tire construction having the claimed crown reinforcement structure, including a pair of crossed belt plies formed of single wire metal cords arranged as bundles and a radially outermost cap layer formed of organic fiber cords. Furthermore, in view of either one of Sinopoli or Gummiwerke, one of ordinary skill in the art at the time of the invention would have found it obvious to include a rubber layer between said belt plies and cap layer in order to control the spacing and optimize the reinforcement characteristics as desired. In describing the rubber layers, Sinopoli and Gummiwerke fail to disclose the 100% tensile stress of said rubber layers and thus necessarily fail to compare the tensile stress of said rubber layers with the tensile stress of the tread (Gummiwerke does suggest a Shore A hardness between 45 and 70). In any event, one of ordinary skill in the art at the time of the invention would have readily appreciated the quantitative relationships of the claimed invention as they are broad and define well-known tire belt structure, as evidenced by Kanamaru. In this instance, Kanamaru suggests that the tread rubber generally has a 100% modulus between approximately 2.5 and 3.5 MPa and further, that an intermediate rubber layer disposed between adjacent belt plies has a greater 100% modulus as compared to the tread rubber (Column 4, Lines 65-68). While the rubber layer of Kanamaru is not exactly the same as that detailed by Sinopoli or Gummiwerke, the reference does provide a general teaching as to the relationship between belt rubber layers and tread rubber compositions. As such, one of ordinary skill in the art at the time of the invention would have found it obvious to form the rubber layer taught by Sinopoli and Gummiwerke with a higher modulus as compared to the tread rubber in view of the

broad range of the claimed invention and the well known makeup of tread layers (individual properties and relationship with additional belt rubber layers), as provided for by Kanamaru.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Justin R Fischer** whose telephone number is **(703) 605-4397**. The examiner can normally be reached on M-F (7:30-4:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Ball can be reached on (703) 308-2058. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Justin Fischer

November 7, 2002

Michael W. Ball
Supervisory Patent Examiner
Technology Center 1700